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Lee et al.

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(54) **NETWORK SYSTEM AND METHOD OF CONTROLLING NETWORK SYSTEM**

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(73) Assignee: **LG ELECTRONICS INC.**, Seoul (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 473 days.

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PCT Pub. Date: **Jun. 3, 2011**

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(30) **Foreign Application Priority Data**

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Dec. 17, 2009 (KR) 10-2009-0126364

(51) **Int. Cl.**
G05D 17/00 (2006.01)
G01R 21/00 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H04L 12/66*** (2013.01)

(58) **Field of Classification Search**
CPC H04L 12/66
USPC 700/291, 297; 702/60–63
See application file for complete search history.

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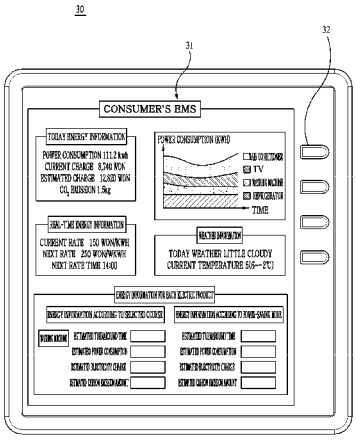
Primary Examiner — Robert Fennema
Assistant Examiner — Thomas Stevens
(74) *Attorney, Agent, or Firm* — Dentons US LLP

(57) **ABSTRACT**

Provided are a network system and a method of controlling the same. The network system includes a metering device metering energy supplied from a power supply source, a communication device by which energy information related to the energy communicates, an energy management device recognizing the energy information to control an operation of an electric product, and an environment information management device recognizing a carbon amount or a carbon dioxide amount, which is generated according to the operation of the electric product. A power-saving operation of the electric product is selectively performed, based on the carbon amount or the carbon dioxide amount recognized by the environment information management device. Since a power management program is executed using an environment information management unit, energy may be further efficiently managed within an intellectual power supply network.

11 Claims, 14 Drawing Sheets



(51) **Int. Cl.**
G01R 31/36 (2006.01)
H04L 12/66 (2006.01)

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Fig. 1

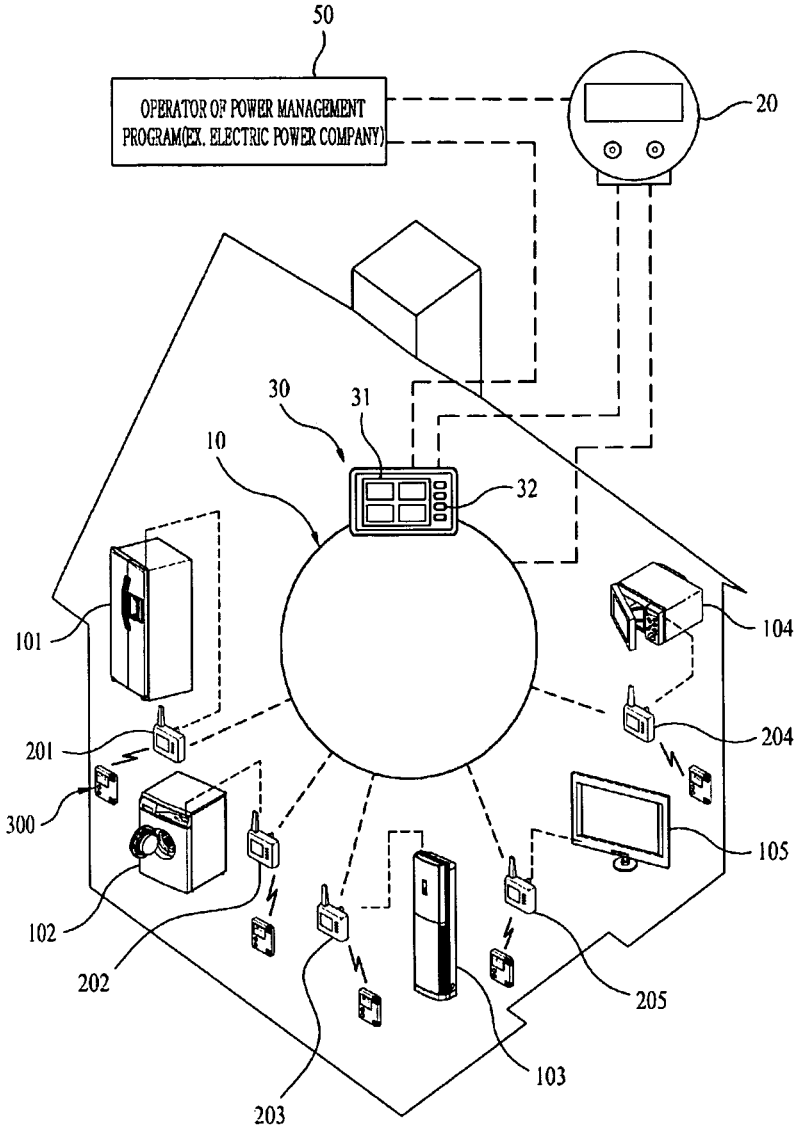

50
OPERATOR OF POWER MANAGEMENT PROGRAM(EX. ELECTRIC POWER COMPANY)
20
30
31
10
32
101
104
201
204
300
105
102
202
205
103
203

Fig. 2

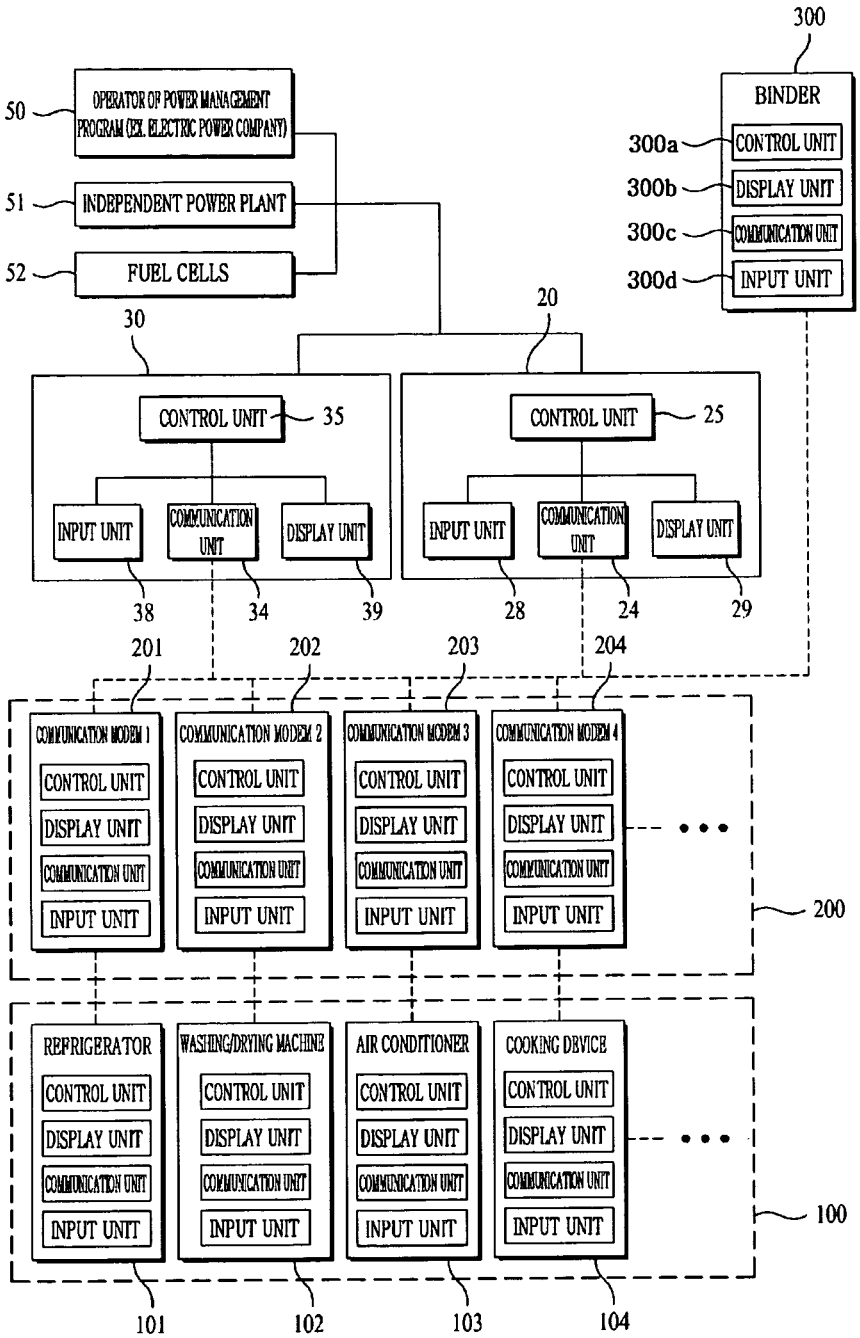

300
BINDER
300a
CONTROL UNIT
300b
DISPLAY UNIT
300c
COMMUNICATION UNIT
300d
INPUT UNIT
50
OPERATOR OF POWER MANAGEMENT PROGRAM (EX. ELECTRIC POWER COMPANY)
51
INDEPENDENT POWER PLANT
52
FUEL CELLS
30
20
CONTROL UNIT
35
CONTROL UNIT
25
INPUT UNIT
COMMUNICATION UNIT
DISPLAY UNIT
INPUT UNIT
COMMUNICATION UNIT
DISPLAY UNIT
38
34
39
28
24
29
201
202
203
204
COMMUNICATION MODEM 1
COMMUNICATION MODEM 2
COMMUNICATION MODEM 3
COMMUNICATION MODEM 4
CONTROL UNIT
DISPLAY UNIT
COMMUNICATION UNIT
INPUT UNIT
200
REFRIGERATOR
WASHING/DRYING MACHINE
AIR CONDITIONER
COOKING DEVICE
100
101
102
103
104

Fig. 3

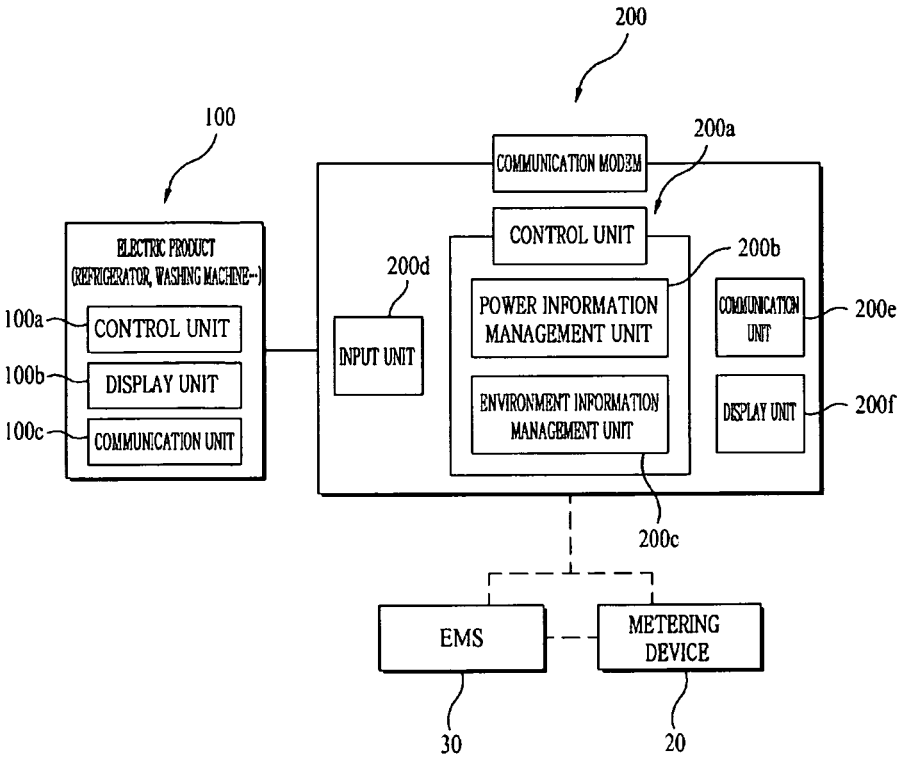

200
100
200a
COMMUNICATION MODEM
CONTROL UNIT
200b
ELECTRIC PRODUCT
(REFRIGERATOR, WASHING MACHINE--)
200d
100a
CONTROL UNIT
INPUT UNIT
POWER INFORMATION MANAGEMENT UNIT
COMMUNICATION UNIT
200e
100b
DISPLAY UNIT
ENVIRONMENT INFORMATION MANAGEMENT UNIT
DISPLAY UNIT
200f
100c
COMMUNICATION UNIT
200c
EMS
METERING DEVICE
30
20

Fig. 4

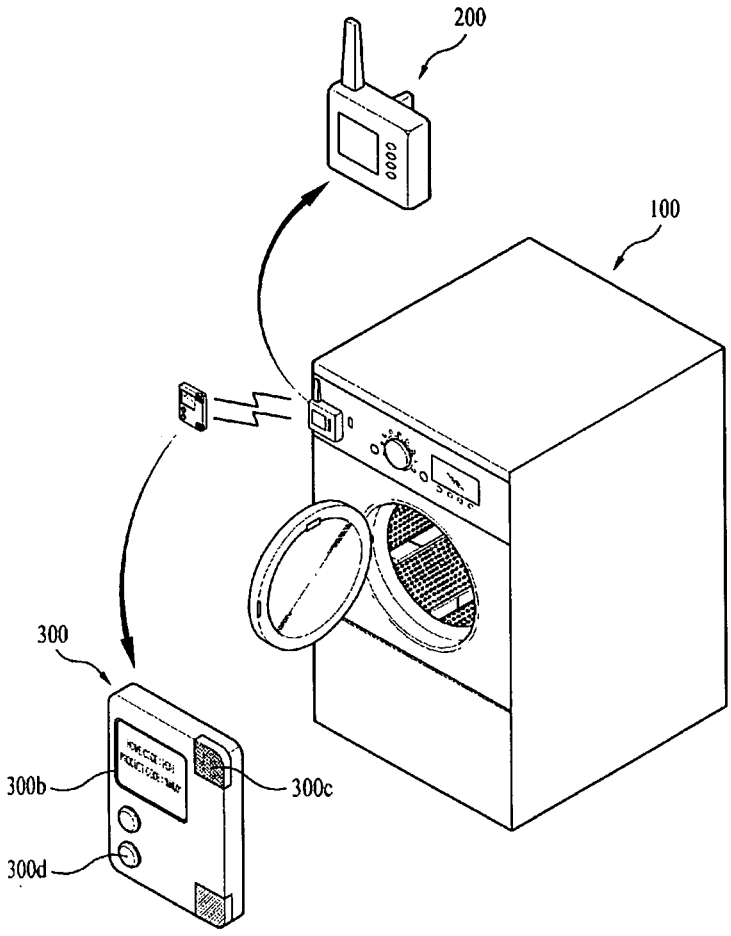


Fig. 5

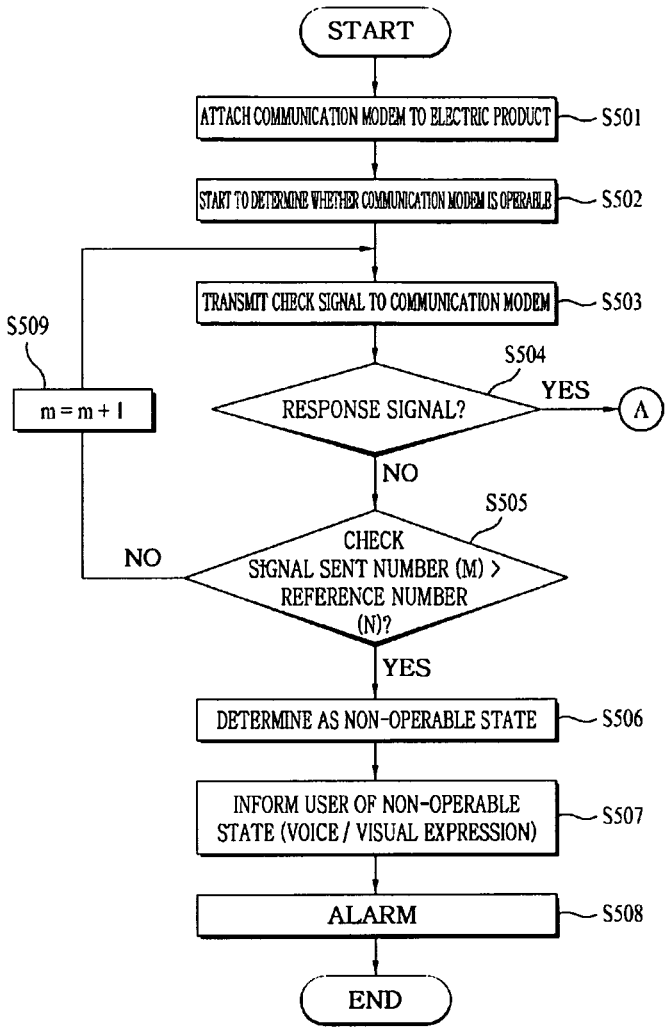

START
ATTACH COMMUNICATION MODEM TO ELECTRIC PRODUCT
S501
START TO DETERMINE WHETHER COMMUNICATION MODEM IS OPERABLE
S502
TRANSMIT CHECK SIGNAL TO COMMUNICATION MODEM
S503
S504
RESPONSE SIGNAL?
YES
A
NO
S505
CHECK SIGNAL SENT NUMBER (M) > REFERENCE NUMBER (N)?
NO
S509
m = m + 1
YES
DETERMINE AS NON-OPERABLE STATE
S506
INFORM USER OF NON-OPERABLE STATE (VOICE / VISUAL EXPRESSION)
S507
ALARM
S508
END

Fig. 6

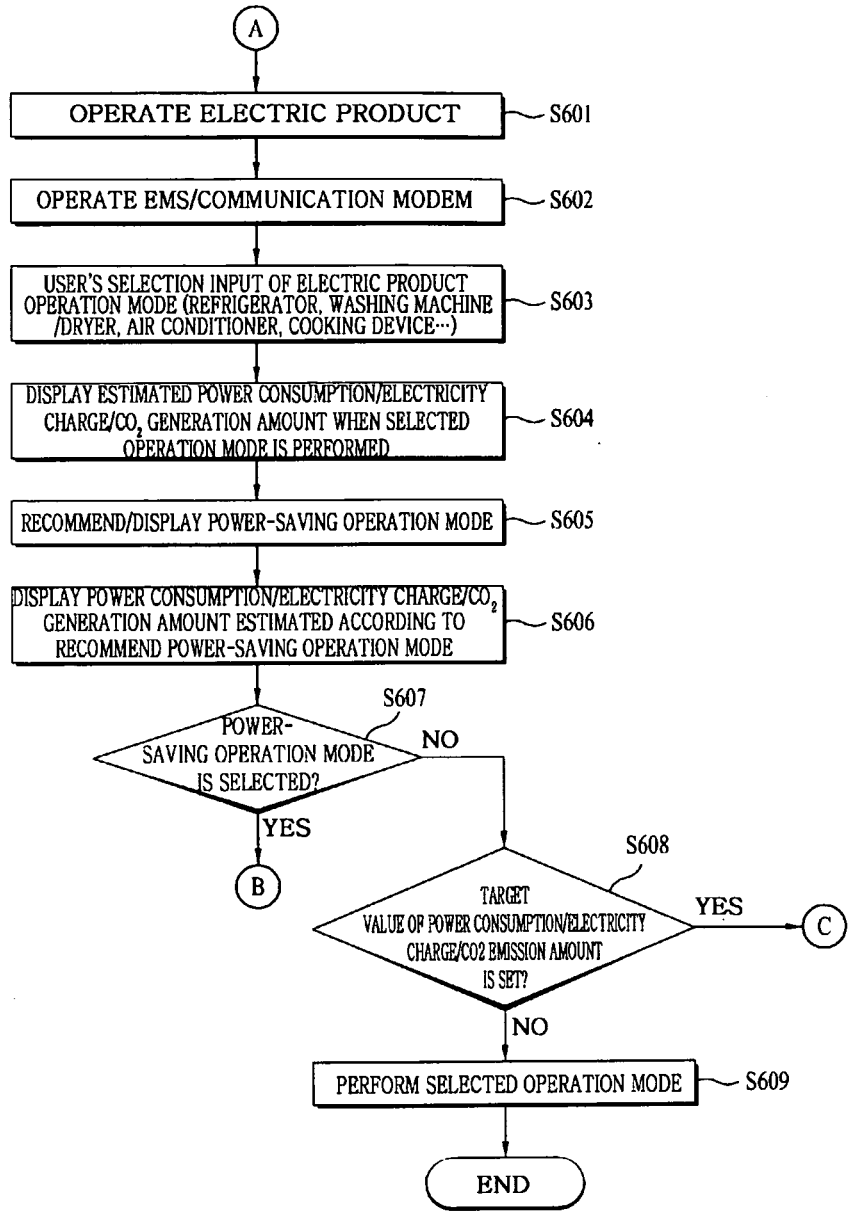

A
OPERATE ELECTRIC PRODUCT
S601
OPERATE EMS/COMMUNICATION MODEM
S602
USER'S SELECTION INPUT OF ELECTRIC PRODUCT OPERATION MODE (REFRIGERATOR, WASHING MACHINE /DRYER, AIR CONDITIONER, COOKING DEVICE···)
S603
DISPLAY ESTIMATED POWER CONSUMPTION/ELECTRICITY CHARGE/CO_2 GENERATION AMOUNT WHEN SELECTED OPERATION MODE IS PERFORMED
S604
RECOMMEND/DISPLAY POWER-SAVING OPERATION MODE
S605
DISPLAY POWER CONSUMPTION/ELECTRICITY CHARGE/CO_2 GENERATION AMOUNT ESTIMATED ACCORDING TO RECOMMEND POWER-SAVING OPERATION MODE
S606
S607
POWER-SAVING OPERATION MODE IS SELECTED?
NO
YES
B
S608
TARGET VALUE OF POWER CONSUMPTION/ELECTRICITY CHARGE/CO2 EMISSION AMOUNT IS SET?
YES
C
NO
PERFORM SELECTED OPERATION MODE
S609
END

Fig. 7

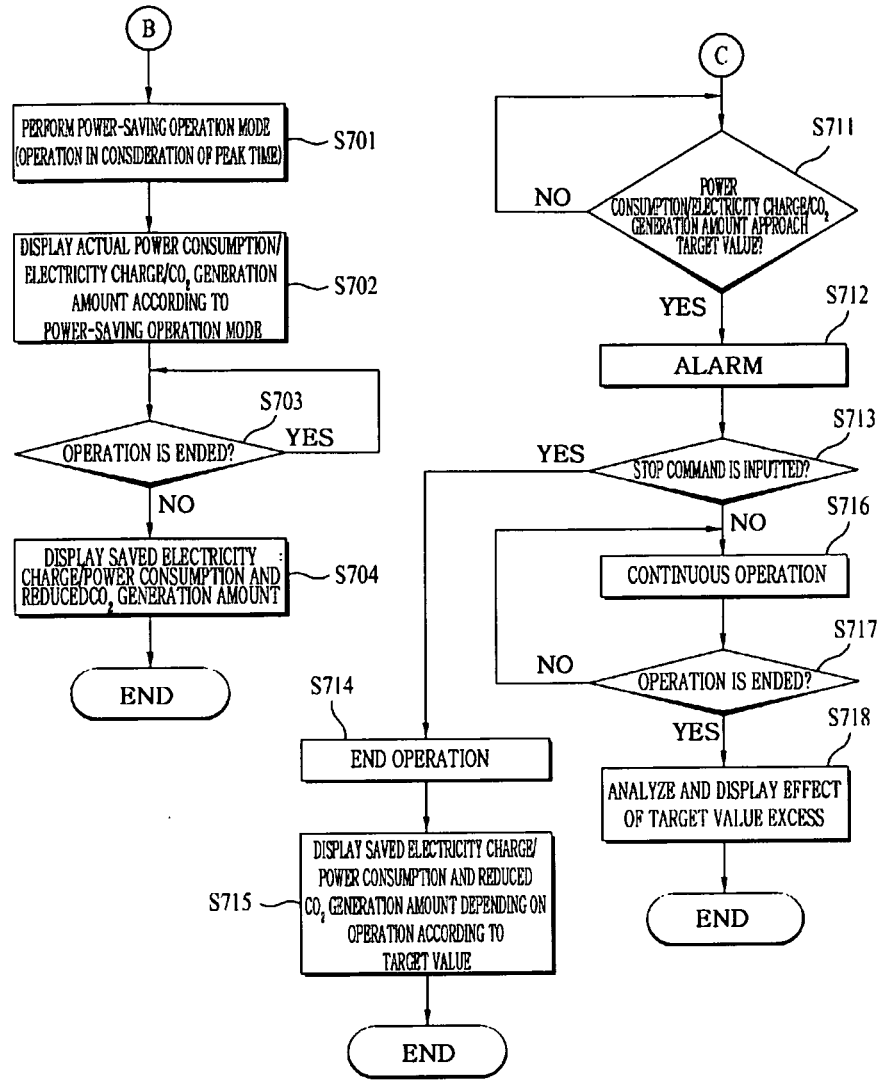

B
PERFORM POWER-SAVING OPERATION MODE (OPERATION IN CONSIDERATION OF PEAK TIME)
S701
DISPLAY ACTUAL POWER CONSUMPTION/ ELECTRICITY CHARGE/CO_2 GENERATION AMOUNT ACCORDING TO POWER-SAVING OPERATION MODE
S702
S703
OPERATION IS ENDED?
YES
NO
DISPLAY SAVED ELECTRICITY CHARGE/POWER CONSUMPTION AND REDUCEDCO_2 GENERATION AMOUNT
S704
END
C
S711
NO
POWER CONSUMPTION/ELECTRICITY CHARGE/CO_2 GENERATION AMOUNT APPROACH TARGET VALUE?
YES
S712
ALARM
S713
YES
STOP COMMAND IS INPUTTED?
NO
S716
CONTINUOUS OPERATION
S717
NO
OPERATION IS ENDED?
YES
S718
ANALYZE AND DISPLAY EFFECT OF TARGET VALUE EXCESS
END
S714
END OPERATION
DISPLAY SAVED ELECTRICITY CHARGE/ POWER CONSUMPTION AND REDUCED CO_2 GENERATION AMOUNT DEPENDING ON OPERATION ACCORDING TO TARGET VALUE
S715
END

Fig. 8

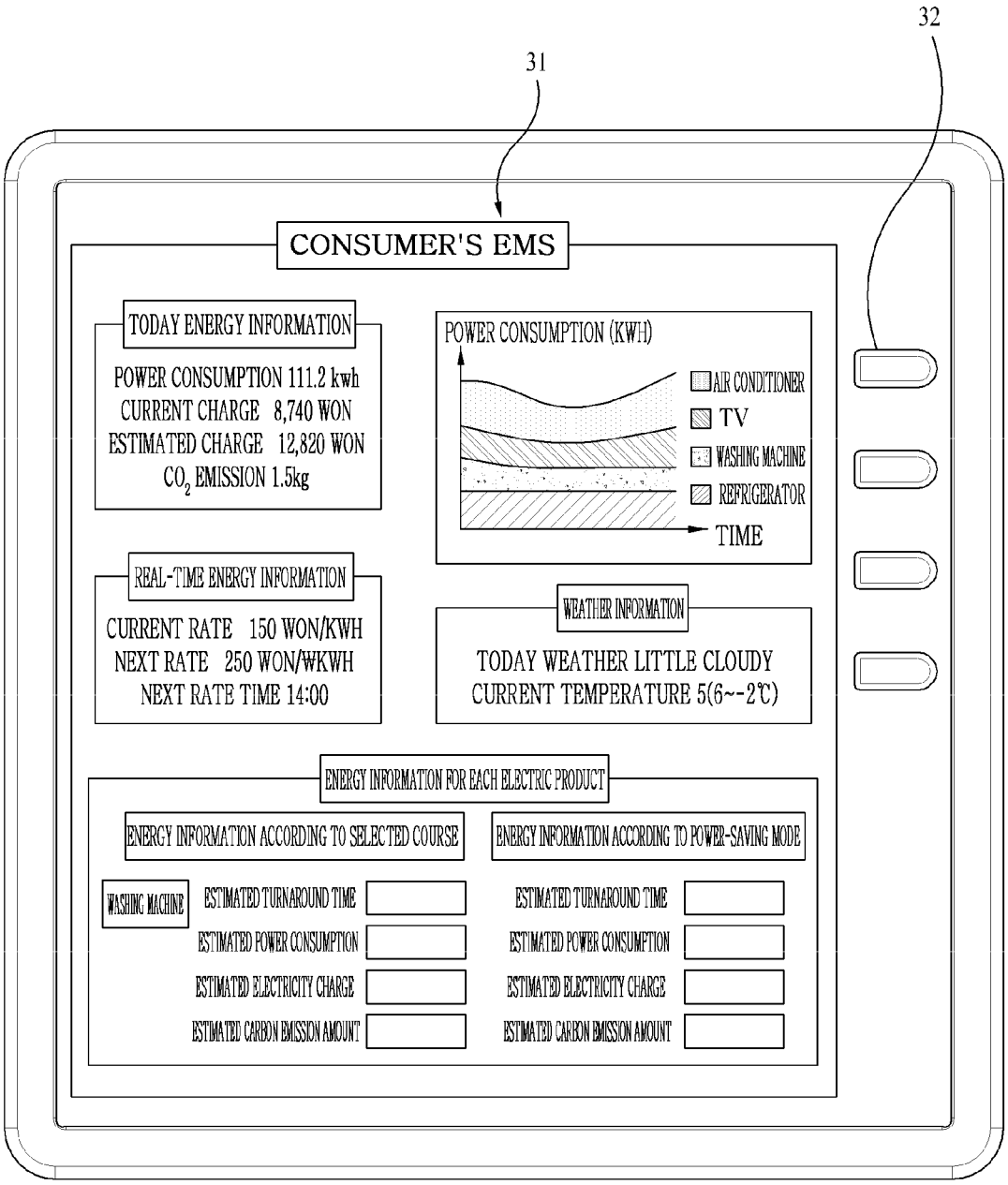

30
31
32
CONSUMER'S EMS
TODAY ENERGY INFORMATION
POWER CONSUMPTION 111.2 kwh
CURRENT CHARGE 8,740 WON
ESTIMATED CHARGE 12,820 WON
CO_2 EMISSION 1.5kg
POWER CONSUMPTION (KWH)
AIR CONDITIONER
TV
WASHING MACHINE
REFRIGERATOR
TIME
REAL-TIME ENERGY INFORMATION
CURRENT RATE 150 WON/KWH
NEXT RATE 250 WON/WKWH
NEXT RATE TIME 14:00
WEATHER INFORMATION
TODAY WEATHER LITTLE CLOUDY
CURRENT TEMPERATURE 5(6~-2℃)
ENERGY INFORMATION FOR EACH ELECTRIC PRODUCT
ENERGY INFORMATION ACCORDING TO SELECTED COURSE
ENERGY INFORMATION ACCORDING TO POWER-SAVING MODE
WASHING MACHINE
ESTIMATED TURNAROUND TIME
ESTIMATED POWER CONSUMPTION
ESTIMATED ELECTRICITY CHARGE
ESTIMATED CARBON EMISSION AMOUNT
ESTIMATED TURNAROUND TIME
ESTIMATED POWER CONSUMPTION
ESTIMATED ELECTRICITY CHARGE
ESTIMATED CARBON EMISSION AMOUNT

Fig. 9

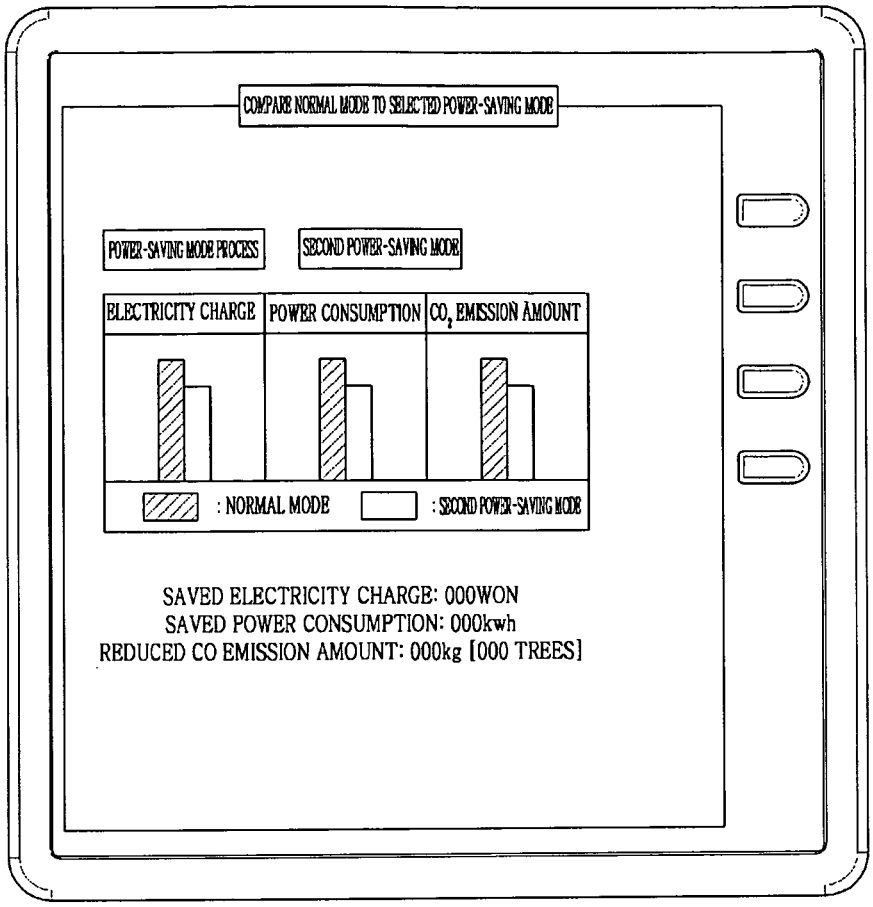

COMPARE NORMAL MODE TO SELECTED POWER-SAVING MODE
POWER-SAVING MODE PROCESS
SECOND POWER-SAVING MODE
ELECTRICITY CHARGE
POWER CONSUMPTION
CO_2 EMISSION AMOUNT
: NORMAL MODE
: SECOND POWER-SAVING MODE
SAVED ELECTRICITY CHARGE: 000WON
SAVED POWER CONSUMPTION: 000kwh
REDUCED CO EMISSION AMOUNT: 000kg [000 TREES]

Fig. 10

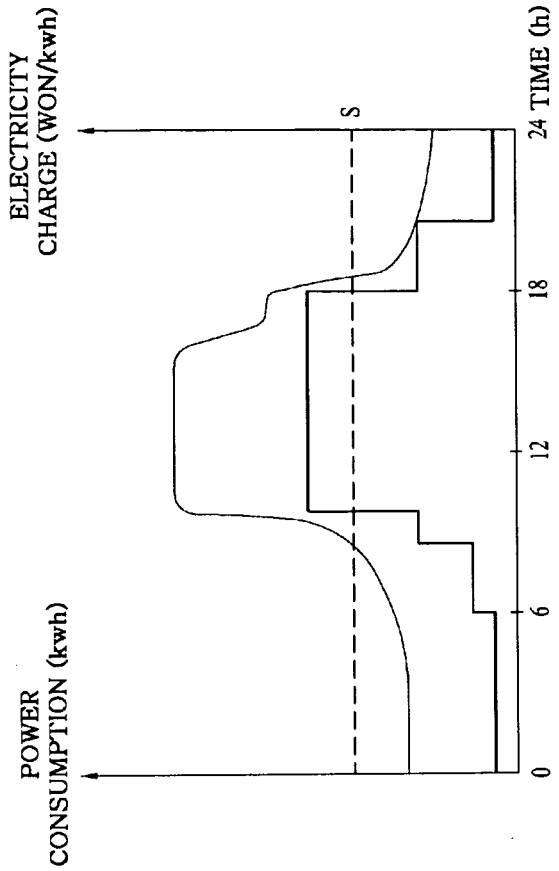

ELECTRICITY CHARGE (WON/kwh)
POWER CONSUMPTION (kwh)
S
0
6
12
18
24 TIME (h)

Fig. 11

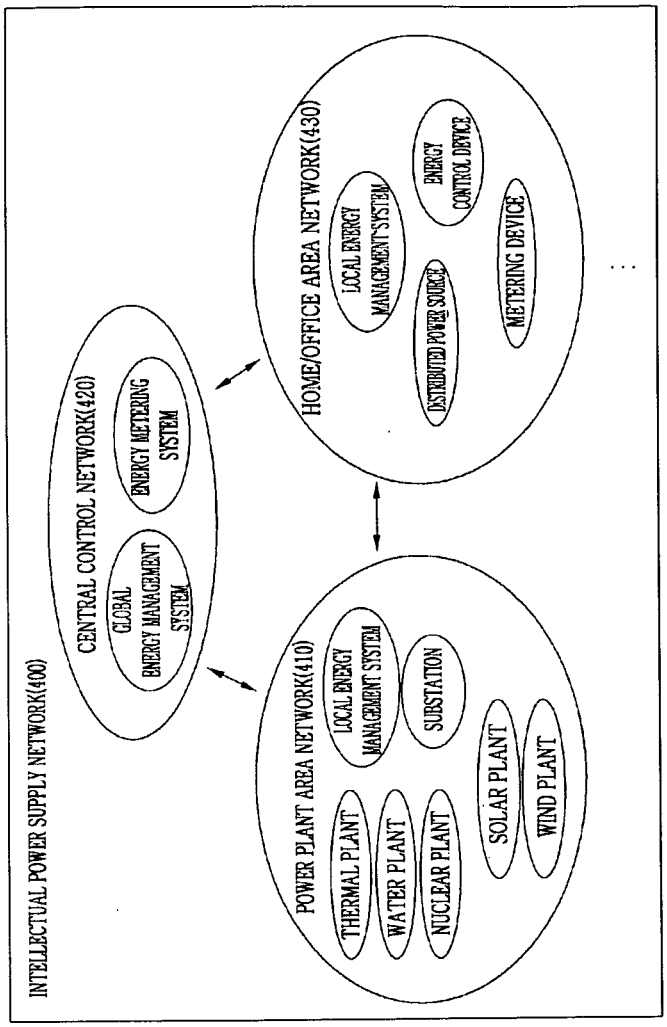

INTELLECTUAL POWER SUPPLY NETWORK(400)
CENTRAL CONTROL NETWORK(420)
GLOBAL ENERGY MANAGEMENT SYSTEM
ENERGY METERING SYSTEM
HOME/OFFICE AREA NETWORK(430)
LOCAL ENERGY MANAGEMENT SYSTEM
ENERGY CONTROL DEVICE
DISTRIBUTED POWER SOURCE
METERING DEVICE
POWER PLANT AREA NETWORK(410)
LOCAL ENERGY MANAGEMENT SYSTEM
SUBSTATION
THERMAL PLANT
WATER PLANT
NUCLEAR PLANT
SOLAR PLANT
WIND PLANT

Fig. 12

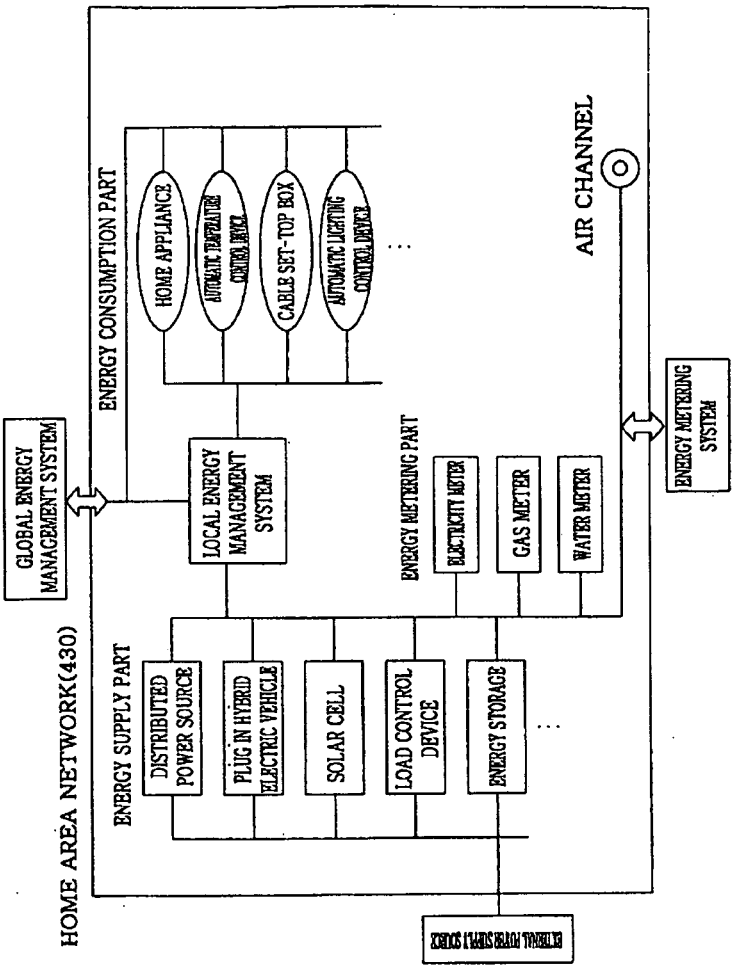

HOME AREA NETWORK(430)
GLOBAL ENERGY MANAGEMENT SYSTEM
ENERGY CONSUMPTION PART
HOME APPLIANCE
AUTOMATIC TEMPERATURE CONTROL DEVICE
CABLE SET-TOP BOX
AUTOMATIC LIGHTING CONTROL DEVICE
...
AIR CHANNEL
ENERGY METERING SYSTEM
LOCAL ENERGY MANAGEMENT SYSTEM
ENERGY METERING PART
ELECTRICITY METER
GAS METER
WATER METER
ENERGY SUPPLY PART
DISTRIBUTED POWER SOURCE
PLUG IN HYBRID ELECTRIC VEHICLE
SOLAR CELL
LOAD CONTROL DEVICE
ENERGY STORAGE
...
EXTERNAL POWER SUPPLY SOURCE

Fig. 13

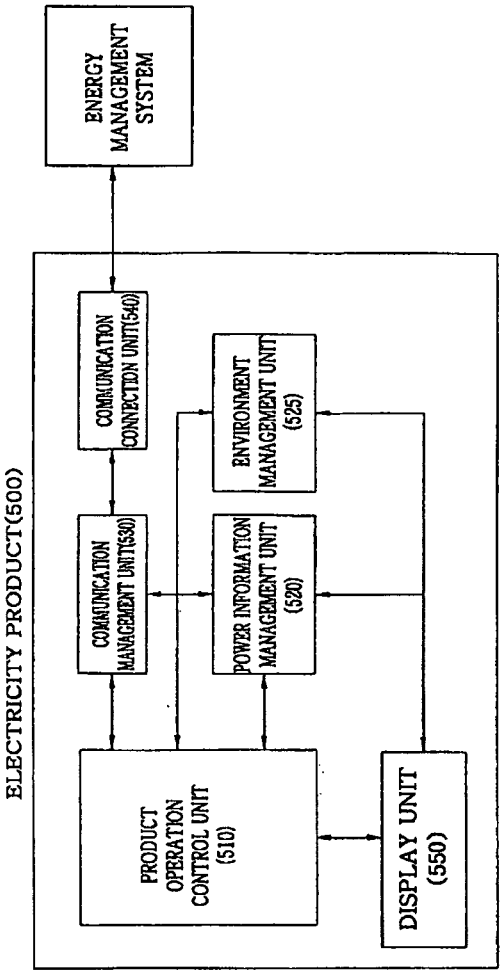
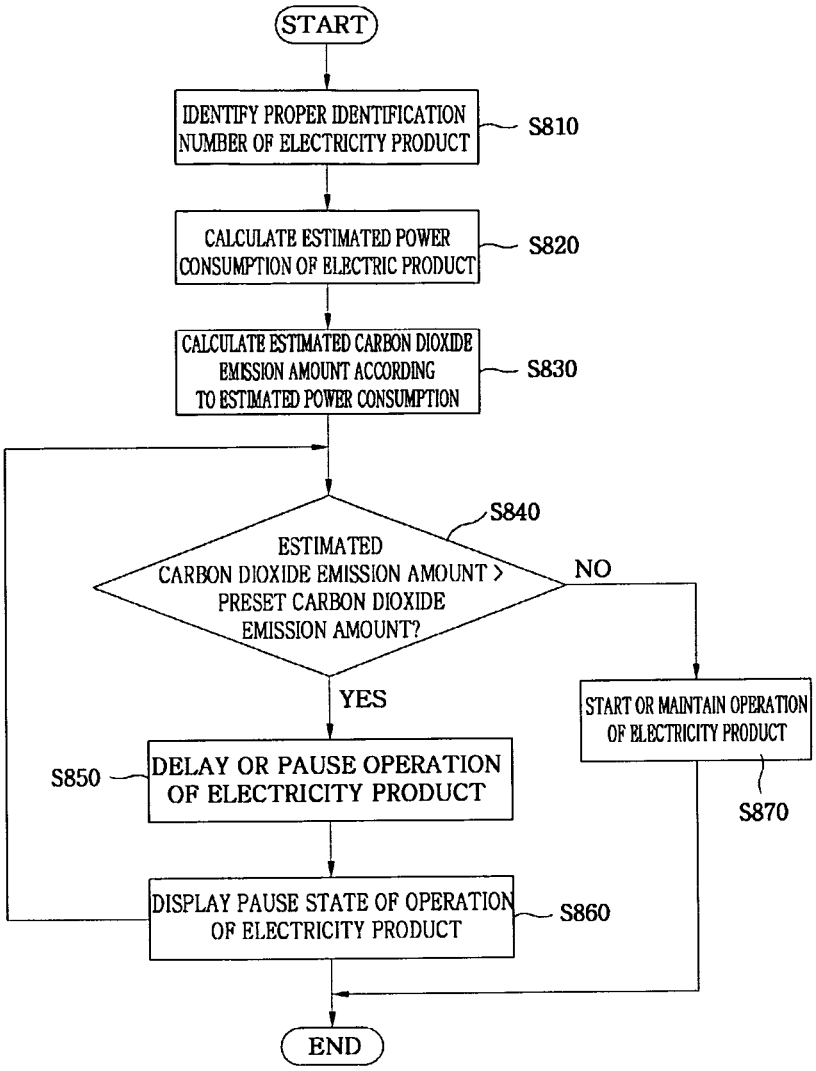

ENERGY MANAGEMENT SYSTEM
ELECTRICITY PRODUCT(500)
COMMUNICATION CONNECTION UNIT(540)
COMMUNICATION MANAGEMENT UNIT(530)
ENVIRONMENT MANAGEMENT UNIT (525)
POWER INFORMATION MANAGEMENT UNIT (520)
PRODUCT OPERATION CONTROL UNIT (510)
DISPLAY UNIT (550)

Fig. 14


START
IDENTIFY PROPER IDENTIFICATION NUMBER OF ELECTRICITY PRODUCT
S810
CALCULATE ESTIMATED POWER CONSUMPTION OF ELECTRIC PRODUCT
S820
CALCULATE ESTIMATED CARBON DIOXIDE EMISSION AMOUNT ACCORDING TO ESTIMATED POWER CONSUMPTION
S830
S840
ESTIMATED CARBON DIOXIDE EMISSION AMOUNT > PRESET CARBON DIOXIDE EMISSION AMOUNT?
NO
YES
START OR MAINTAIN OPERATION OF ELECTRICITY PRODUCT
S870
S850
DELAY OR PAUSE OPERATION OF ELECTRICITY PRODUCT
DISPLAY PAUSE STATE OF OPERATION OF ELECTRICITY PRODUCT
S860
END

NETWORK SYSTEM AND METHOD OF CONTROLLING NETWORK SYSTEM

This application claims the benefit of priority of PCT Application No. PCT/KR2010/008435 filed on Nov. 26, 2010 which claims the benefit of priority of Korean Application No. 10-2009-0115203 filed on Nov. 26, 2009 and Korean Application No. 10-2009-0126364 filed on Dec. 17, 2009, all of which are incorporated by reference in their entirety herein.

TECHNICAL FIELD

The present disclosure relates to a network system and a method of controlling the network system.

BACKGROUND ART

In general, power for operating electric products such as electric home appliances or office equipment is supplied through a power plant, a power transmission line, and a power distribution line.

Such power is supplied from a central power source, not a distributed power source, so that the power spreads in a radial shape from the center to the periphery, which is supplier-centered rather than consumer-centered.

In addition, the supplying of the power is analog and electromechanical, and damage due to an accident is manually undone, and related facilities are manually recovered.

The information about electricity charge can be known only through a power exchange, and thus, it is difficult to know the information about electricity charge in real time. In addition, since a pricing system is substantially fixed, it is difficult to provide incentives for consumers by using price variations.

To address these limitations and improve the efficiency of energy, researches are being actively carried out on a power network, which can realize a flexible power control. The power control may include a consumption reaction control or an intellectual power control.

As described above, the current power network is vertical and centralized network that is controlled by a supplier, but the consumption reaction control or the intellectual power control is a horizontal, cooperative, and distributed network that is distributed from a supplier and allows the interaction between suppliers and consumers.

When the flexible power control is realized, for power consumers such as a house or a building, it is needed that a separate electric product and a network connected to a plurality of electric products communicate with a power supply source through a two-way communication for power information, instead of just receiving power. Also, devices for the two-way communication are needed.

DISCLOSURE OF INVENTION

Technical Problem

Embodiments provide a method of more efficiently managing power within an intellectual power supply network.

Embodiments also provide an electric product, which performs a power management program using an environment information management unit.

Embodiments also provide a network system in which a communication modem detachably disposed on an electric product manages power information or manages and processes environment information to reduce an electricity charge or a carbon dioxide emission amount.

Embodiments also provide a network system in which a communication modem is easily detached to an electric product to allow the corresponding electric product to be easily participated in a power management program related to a power management network.

Solution To Problem

In one embodiment, a network system includes: a metering device metering energy supplied from a power supply source; a communication device by which energy information related to the energy communicates; an energy management device recognizing the energy information to control an operation of an electric product; and an environment information management device recognizing a carbon amount or a carbon dioxide amount, which is generated according to the operation of the electric product, wherein a power-saving operation of the electric product is selectively performed, based on the carbon amount or the carbon dioxide amount recognized by the environment information management device.

In another embodiment, a method of controlling a network system including a communication device by which energy information related to energy supplied from a power supply source communicates and an energy management device controlling an operation of an electric product based on the energy information includes: recognizing a carbon dioxide emission amount generated or estimated corresponding to one operation mode of the electric product; and performing an operation for reducing power consumption of the electric product, based on a result obtained by comparing the estimated carbon dioxide emission amount to a preset target value of a carbon dioxide emission amount.

Advantageous Effects of Invention

According to the present disclosure, since the power management program is executed using the environment information management unit, the energy may be further efficiently managed within the intellectual power supply network.

Also, since the users select the power supply source according to the real-time power information, the electricity costs may be minimized and the energy efficiency may be improved.

Also, since the operation mode of the electric appliance is selected, the power consumption may be further efficiently managed.

Also, since the power consumption pattern is estimated for a predetermined period and the power is used based on the estimated information, the energy may be further efficiently managed. Also, since the power consumption information is continuously accumulated in the data storage, accuracy of the estimated power consumption may be improved, thereby efficiently managing the power consumption.

Also, since the user recommends the power-saving operation mode provided from the power information management unit or the environment information management unit of the communication modem instead of the randomly inputted operation mode, user's convenience may be improved.

Also, when the user selects the power-saving operation mode or the electric product is operated according to the target value of the electricity charge, the power consump-

tion, or the carbon dioxide emission amount, the saved electricity charge and power consumption or the reduced carbon dioxide emission amount may be clearly informed to the user.

Thus, there is an advantageous that the user may certainly recognize economical profit and positive environmental inference due to the power-saving operation mode.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a schematic view of a power management network according to an embodiment.

FIG. **2** is a block diagram of a power management network according to an embodiment.

FIG. **3** is a control block diagram of a power management network according to an embodiment.

FIG. **4** is a perspective view illustrating a state in which a communication modem is mounted on an electric product according to an embodiment.

FIGS. **5** to **7** are flowcharts illustrating a process of controlling a network system according to an embodiment.

FIGS. **8** and **9** are views of an energy management system displaying results according to the control method.

FIG. **10** is a graph of an electricity charge and power consumption depending on a time.

FIG. **11** is a schematic view of an intellectual power supply network according to another embodiment.

FIG. **12** is a schematic view of a home area network according to another embodiment.

FIG. **13** is a block diagram illustrating internal components of an electric product according to another embodiment.

FIG. **14** is a flowchart illustrating a process of controlling an electric power in consideration of environmental effects according to another embodiment.

MODE FOR THE INVENTION

Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings. The invention may, however, should not be construed as being limited to the embodiments set forth herein; rather, that alternate embodiments included in other retrogressive inventions or falling within the spirit and scope of the present disclosure will fully convey the concept of the invention to those skilled in the art.

All terms used herein have the same meanings as general terms understood by those of ordinary skill in the art. If the terms used herein collide with the general terms, the terms used herein take priority over the general terms. While the present disclosure has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present disclosure as defined by the following claims. Like reference numerals refer to like elements throughout.

FIG. **1** is a schematic view of a power management network **10** according to an embodiment.

The power management network includes a metering device (smart meter) **20** which can measure power supplied to a residential customer and the electricity charge of the power in real time and an energy management system (EMS) **30** connected to the metering device (smart meter) **20** and a plurality of electric products such as home appliances for controlling the electric products.

Here, the electricity charge is measured based on price for each time. The price for each time is expensive in a time period where power consumption increases steeply and inexpensive in a time period such as midnight where a relatively small amount of power is consumed.

The power management network **10** is operated by a power management program made to efficiently mange electricity charges and power consumption in the residential customer according to time-varying electricity costs.

For executing the power management program, the EMS **30** and the metering device (smart meter) **20** communicates with an operator **50** of the power management program, such as an electric power company.

Here, the EMS **30** may be provided in the form of a terminal, which includes a screen **31** to display the current power consumption state and external environments (temperature, humidity) and an input unit **32** to receive user' manipulations.

The EMS **30** and the metering device (smart meter) **20** are selectively or simultaneously connected to the electric products such as a refrigerator **101**, a washing or drying machine **102**, an air conditioner **103**, a TV **105**, and a cooking device **104** through an in-house power management network.

Communication modems **200** (**201** to **205**) are detachably provided to the electric products as a communication device for wireless communication with the EMS **30** and the metering device (smart meter) **20**. The communication modems **200** may be coupled to the outsides of the electric products for each attachment and detachment. Also, for the detachment of the communication modem **200**, a slot or port may be provided in each of the electric products.

The communication modems **200** are operated according to ZigBee (wireless communication method) for communications such as one-to-one, one-to-many, and many-to-many communications. However, the communication method of the communication modems **200** is not limited to ZigBee. Other wireless communication methods may be used.

Therefore, power information or operation information of the electric products connected to the communication modems **200** may be transmitted to the EMS **30** or the metering device (smart meter) **20** through the communication modems **200**, and the information may be transmitted in the opposite direction.

The network system further includes a power management network binder (hereinafter, referred to as a "binder") to register the communication modem **200** in the power management network **10**.

When an input unit is manipulated to register the communication modem **200** after the binder **300** is disposed around the communication modem **200**, the binder **300** grants a home code and a product code to the communication modem **200**. In this process, the communication modem **200** may be registered in the power management network **10**.

FIG. **2** is a block diagram of a state in which each component is connected to a power management network according to an embodiment.

Referring to FIG. **2**, a power management program operator **50** may be an electric power company having a general power generation plant (e.g., thermal power, nuclear power, and water power generation plants) or a power generation plant using renewable energy sources (e.g., solar light, wind power, and geothermal power) as a power supply source. However, the power management program operator **50** is not limited thereto.

In addition, the power management network **10** may include an independent power plant **51** such as a solar power

generation plant of a residential customer or office and fuel cells **52** of a fuel cell vehicle or a residential customer as other power supply sources. Such power supply sources and the power management program operator **50** may be connected to the metering device (smart meter) **20** and the EMS **30**.

In addition, the metering device (smart meter) **20** and the EMS **30** may communicate with the electric products through the communication modems **200**.

The metering device (smart meter) **20** may include a first control unit **25**, a first input unit **28**, a first communication unit **24**, and a first display unit **29**. The EMS **30** may include a second control unit **35**, a second input unit **38**, a second communication unit **34**, and a second display unit **39**.

The communication units **34** and **24** communicate with the communication modems **200** (**201** to **204**) of the in-house electric products **100** such as the refrigerator **101**, the washing or drying machine **102**, the air conditioner **103**, and the cooking device **104** to transmit and receive power information and operation information.

In at least one of the EMS **30** and the metering device (smart meter) **20**, the control units **25** and **35** check information in real time, such as setting information input by a user through the input unit **28** or **38**, existing accumulated operation and power consumption history information of the electric products **100**, and external power supply information. Also, the EMS **30** or the metering device (smart meter) **20** processes such information to control operations of the electric products and power supplied to the electric products.

The display units **29** and **39** display power information supplied from the power supply sources or operation and power information of the electric products, and communication states of the electric products **100**.

The EMS **30** or the metering device (smart meter) **20** controls operations of the electric products so that the electric products perform a saving mode, for example, an electricity charge saving mode for saving electricity charges (energy charges) of the electric products or an energy saving operation mode for reducing power consumption. The electricity charge saving mode may be performed, based on information with respect to electricity rates changed in real time according to operation times of the electric products.

The EMS **30** or the metering device (smart meter) **20** controls the electric products in consideration of a peak time period in which electricity charge is the most expensive in a day, or in consideration of an upper limit of power consumption or electricity charge.

The electricity charge saving mode is controlled based on the peak time period or the upper limit of the power consumption. Also, the electric products may be jointed to the power management program provided by the electric power company to effectively perform a saving operation (e.g., energy saving operation and electricity charge saving operation).

If electric power is managed by joining the power management program, electricity charge may be saved, and moreover other effects may be attained such as getting a benefit of electricity charge reducing policies.

The communication modems **200** (**201** to **204**) may include control units, display units, communication units, and input units. Thus, the communication modems **201** to **204** may display current communication states and receive user's inputs.

The communication modems **200** are connected to the EMS **30** or the metering device (smart meter) **20** for communication and transmit commands according to the power management program to the electric products **100**. Thus, the electric products **100** may be controlled according to the power management program.

In addition, the control units of the communication modems **200** may be configured to control the electric products **100** according to time-varying electricity rates, an upper limit of electricity charge, or an upper limit of power consumption. That is, the electric products **100** may operate in power-saving operation mode such as the electricity charge saving mode or the energy-saving operation mode under self control conditions using the communication modems **200**.

Each of the electric products **100** may include a display unit and a control unit. The display unit may display an operation state of the electric product **100** and a communication state of the communication modem **200** of the corresponding electric product **100**.

Therefore, a user may easily check communication states (whether communication therebetween is possible) of the communication modems **200** through at least one of the EMS **30**, the metering device (smart meter) **20**, the communication modems **200**, and the electric products **100**. If any one of the communication modems **200** is abnormal, the user may reinstall the communication modem **200** on the electric product **100** or replace the communication modem **200**.

The past operation information or power consumption information for each time may be stored in the control unit of the electric product **100**. The information may be used when the power management program is performed by itself during emergency such as out of communication of the communication modem **200**.

The binder **300** includes a control unit **300***a*, a display unit **300***b*, a communication unit **300***c*, and an input unit **300***d*. Also, the binder **300** grants the home code to a non-registered electric product. The electric product to which the home code is granted may be registered in the power management network **10**.

When the electric product is registered in the power management network **10**, the electric product may become a component of the power management network in which the power management program provided from the power company is performed. The electric product is operated to reduce an electricity charge, power consumption, or a carbon discharge amount according to a command of the power management program.

The communication unit **300***c* communicates with a communication unit of a registration object electricity product, and the input unit **300***d* receives a registration command of the registration object electricity product. Typically, the registration command is entered by manipulating the input unit **300***d* using a user s hand. Also, the display unit **300***b* displays information related to the registration, i.e., the home code, a product code, and whether the registration is completed.

The control unit **300***a* is connected to the display unit **300***b*, the communication unit **300***c*, and the input unit **300***d*. Thus, when an input command for registration occurs, the control unit **300***a* controls the electric product that is a registration object to output a home code transmission command related to the power management network. Here, the control unit **300***a* may output a control command for granting a product code, selectively, an identification code as well as the home code.

As shown in FIG. **3**, the communication modem **200** includes a control unit **200***a*, an input unit **200***d*, a communication unit **200***e*, and a display unit **200***f*. The control unit

200*a* includes a power information management unit **200***b* and an environment information management unit **200***c*. An electric product **100** comprises a display unit **100***b* and a communication unit **100***c*.

The power information management unit **200***b* stores information with respect to an electricity charged in real time. That is, the power information management unit **200***b* stores operation information of the electric product **100** connected to the communication modem **200** and information with respect to power consumption depending on each operation mode. When the operation of the electric product **100** is required, the power information management unit **200***b* recommends a power saving operation mode based on the foregoing information or grants a command for executing the power-saving operation mode.

The environment information management unit **200***c* may store data with respect to a carbon dioxide emission amount corresponding to power consumption (or electricity charge) depending on each operation mode of the electric product **100** and calculate (recognize) the carbon dioxide emission amount. Also, when the carbon dioxide emission amount exceeds a predetermined reference, the environment information management unit **200***c* may warns the excess of the carbon dioxide emission amount or give an operation stop or delay command to the electric product **100**.

The carbon dioxide emission amount may be displayed as a weight unit. Alternatively, the carbon dioxide emission amount may be displayed as the number of tree, which absorbs carbon dioxide as much as the weight.

The power information management unit **200***b* and the environment management unit **200***c* may communicate with the EMS **30** or the metering device **20** to transmit and receive the information with respect to the power-saving operation mode included in the power management program or perform update of the information.

As described above, each of the power information management unit **200***b* and the environment management unit **200***c* may be provided as a component of the communication modem, or as a component of the EMS **30** or the metering device **20**. That is, the power information management unit **200***b* and the environment management unit **200***c* are not limited to their position.

The control unit **100***a* of the electric product **100** controls an operation of the electric product **100**, based on the information with respect to the electricity charge or the carbon dioxide emission amount, which is transmitted from the power information management unit **200***b* and the environment management unit **200***c* and the operation command according to the information.

As shown in FIG. **4**, the communication modem **200** is fitted into a coupling part (e.g., port or slot) disposed in the electric product **100**. Since the user easily installs or separates the communication modem **200** on/from the electric product **100**, cumbersome procedures such as call of a servicer are not required when the communication modem **200** is connected to the power management network to perform the power management program.

In the state where the communication modem **200** is mounted on a non-registered electric product **100** that is a registration object, when the user pushes the input unit **300***d* having a button shape after the binder **300** approaches the communication modem **200**, a home code related to the power management network may be granted to register the non-registered electric product **100**.

Here, the display unit **300***b* may display at least one or more of the home code, the product code, and the identification code.

The binder **300** and the communication modem **200** may perform the registration process through the home code grant in a near field communication manner by which the communication therebetween is possible only within a predetermined distance. Thus, the communication between the binder **300** and the communication modem **200** may not affect other electric products.

Hereinafter, a control operation according to an embodiment will be described with reference to the accompanying drawings. FIGS. **5** to **7** are flowcharts illustrating a process of controlling a network system according to an embodiment.

Referring to FIG. **5**, when a communication modem is mounted on a specific electric product in operation S**501**, it is started to check whether the mount of the communication modem is defective or the communication of the communication modem is possible in operation S**502**. In operation S**503**, a check signal may be transmitted from the EMS, the metering device (smart meter), or the corresponding electric product into the communication modem.

In operation S**504**, it is determined whether the communication modem outputs a response signal. If it is determined that there is no response signal, it is determined whether the sent number (m) of the check signal exceeds a predetermined reference number (n) in operation S**505**. Since it is not reliable to determine the communication state of the communication modem after sending a check signal once, the check signal is sent several times to reliably determine the communication state of the communication modem. If the communication modem does not response although the check signal is sent several times, it is determined that the communication modem is not operable for communication.

In the state where there is no response signal, if the sent number (m) of the check signal does not exceed the reference number (n), a check signal sending process is performed again in operations S**509** and S**503**. On the other hand, in the state where there is no response signal, if it is determined that the sent number (m) of the check signal exceeds the reference number (n), it is determined that the communication modem is not operable for communication in operation S**506**.

To rapidly inform the non-operable state of the communication modem connected to a specific electric product to a user, the non-operable state of the communication modem is displayed on at least one of the EMS, the metering device (smart meter), and the corresponding electric product to inform it to the user in operation S**507**. Here, the non-operable state may be reported by a sound expression such as an alarming sound as well as a visual expression.

If the non-operable state continues, an alarming message may be displayed to warn the user of the possibility of regarding it as withdrawal from a power management program provided by the electric power company and the resulting disadvantages in operation S**508**.

As shown in FIG. **6**, if there is a response signal from the communication modem, it is determined that the communication modem is properly attached to the electric product and operable for communication in operation S**601**. In this state, when the user operates the electric product in operation s**601**, the EMS and the metering device are operated to operate the communication modem in operation S**602**.

Also, when the user randomly selects an operation mode of the electric product to input the selected operation mode in operation S**603**, power consumption, an electricity charge, a carbon dioxide emission amount, which are estimated when the randomly selected operation mode is performed are calculated by the power information manage-

ment unit or the environment management unit, and then, the calculated results are displayed on each display unit of the energy management device, the metering device, and the electric product in operation S**604**.

In operation S**605**, a power saving operation mode, which has a function (operation effect) similar to that of the operation mode selected by the user and reduces the power consumption, the electricity charge, and the carbon dioxide emission amount is recommended and displayed. Also, in operation S**606**, estimated power consumption, electricity charge, and carbon dioxide emission amount depending on the power saving operation mode may be displayed.

In operation S**607**, it is determined whether the power saving operation mode is selected. As shown in FIG. **7**, if the user selects the power saving operation mode, the power saving operation mode is performed. As shown in FIG. **10**, in operation S**701**, the power saving operation mode may be an operation mode for minimizing the power consumption or stopping an operation of the electric product in the peak time period in which the electricity charge is above a set value S.

In operation S**702**, actual power consumption, electricity charge, carbon dioxide emission amount are displayed during the power saving operation mode. In operation S**703**, it is determined whether the operation is ended. When it is determined that the operation is ended, an actually saved electricity charge, power consumption, and a reduced carbon dioxide emission amount may be displayed to allow the user to recognize the information S**704**.

Referring again to FIG. **6**, when the user does not select the power saving operation mode, it is determined whether a target value of at least one of an electricity charge, power consumption, and a carbon dioxide emission amount is set in operation S**608**. If the target value is not set, the operation mode selected by the user is performed in operation S**609**.

If the target value is set, as shown in FIG. **7**, it is determined whether current electricity charge, power consumption, or carbon dioxide emission amount approaches the target value during the operation according to the target value in operation S**711**. For example, a degree approaching the target value may be about 90% of the target value.

In operation S**712**, when the electricity charge, the power consumption, or the carbon dioxide emission amount approaches the target value, a warning event is generated to allow the user to recognize the information in operation S**712**.

In operation S**713**, it is determined whether the user inputs a stop command. When the stop command is inputted to end the operation in operation S**714**, an electricity charge, power consumption, or a carbon dioxide emission amount saved by the operation depending on the target value is displayed m operation S**715**.

On the other hand, when the operation is continues in operation S**716**, it is determined whether the operation is ended in operation S**717**. In case where the electricity charge, the power consumption, or the carbon dioxide emission amount exceeds the target value, exceeded factors are analyzed, and then, the analyzed results are displayed in operation S**718**.

FIGS. **8** and **9** are views of an energy management system **30** displaying results according to the control method.

Referring to FIG. **8**, since the estimated energy information depending on the selection mode selected by the user and the estimated energy information depending on the energy saving mode calculated and recommended by the power information management unit and the environment management unit are comparably displayed, the user compares the two modes.

Also, FIG. **9** illustrates results obtained by comparing the selection mode to the power saving mode after the operation is ended. Thus, the user may recognize the saved electricity charge and power consumption or the reduced carbon dioxide emission amount, which are actually selected by oneself.

FIG. **11** is a schematic view of an intellectual power supply network according to another embodiment.

Referring to FIG. **11**, an intellectual power supply network **400** may include at least one local area network or at least one global area network. For example, the local area network may include a power plant area network **410** capable of sharing power information (energy information) between power plants, a home area network **430** capable of sharing power information between electric appliances within a house, an office area network **430** capable of sharing power information between electric appliances within an office, or a central control network **420** capable of controlling power information between local areas. The home area network **430** and the office area network **430** are called a "power consumption area network".

The global area network may represent a network including at least two or more local area networks. Also, the global area network may be understood as a relative concept corresponding to the local area network.

As one example of the intellectual power supply network **400** applied to the present disclosure, the intellectual power supply network **400** may include the power plant area network **410**, the central control network **420**, and at least one home/office area network **430**.

The power plant area network **410** may include a power plant generating an electric power through thermal power generation, nuclear power generation, or water power generation and solar and wind power plants, which respectively use renewable solar energy and wind power. Here, a unit constituting the power plant area network **410** such as the thermal power plant and the nuclear power plant may be called a "power plant component".

An electric power generated in a thermal power plant, a nuclear power plant, or a water power plant is supplied into a substation through a power line, and the substation converts voltage or current properties to distribute the converted electric power into consumers within the home/office area network. Also, the electric power generated using the renewable energy is supplied into the substation, and then is distributed into each of the consumers.

The intellectual power supply network **400** may include an energy management system (EMS). The EMS represents a system for managing an energy control device using an energy management program. For example, the energy control device may include an automatic temperature control device, a cable set-top box, and an intellectual display device, and an automatic lighting control device. The energy management system may communicate with the energy control device to manage power of each residential consumer in real time. Also, the energy management system may estimate power consumption in real time, based on accumulated data. The energy management system may be set for each residential consumer or supplier, and furthermore, may be set for each local area network or each global area network. Also, the energy management system may be provided as an energy management device. For example, a real-time price signal of an electricity market is broadcasted through a local energy management system installed in each home. Since the local energy management system commu-

nicates with each electric appliance to control the electric appliance, a user may recognize power information of each electric appliance through the local energy management system and perform a power management such as power amount limitation set-up or electricity charge limitation set-up, based on the power information, thereby saving energy and costs.

The intellectual power supply network may include an energy metering system. The energy metering system represents a system, which measures energy usage through metering devices to collect and analyze information with respect to use of energy. For example, the metering devices may include an electricity meters, gas meters, and water meters.

The energy management system and the energy metering system may allow the user to efficiently use electricity. Also, the energy management system and the energy metering system may detect errors with respect to a system to allow a power supplier to efficiently operate the system.

For example, when the real-time price signal of the electricity market is broadcasted through the energy management system installed in each home, since the energy management system communicates with each electric appliance to control the electric appliance, the user may recognize the power information of each electric appliance through the local energy management system and perform the power management such as the power amount limitation set-up or the electricity charge limitation set-up, based on the power information, thereby saving energy and costs.

In case of the home area network **430**, residential customers may produce electricity by itself using a solar battery or fuel cell of a plug in hybrid electric vehicle (PHEV) for their consumption, and the remaining electricity may be supplied or sold into the other local area network. Also, an energy metering device may be provided in each of local area networks to check an electric power consumed for each of the consumers or electricity bills in real time, and thus a power supply unit within the local area networks may recognize the present power consumption amount and electricity charge to take action for reducing power consumption or electricity costs based on the real-time information about the power consumption and electricity charge. Also, two-way communication may be possible between the local area networks or units within the local area networks. In addition, the two-way communication may be possible between a unit within one local area network and a unit within the other local area network. Here, the unit may include a power plant, an electric company, a distributed power source, an energy management system, an energy metering system, an intellectual device, or an electric device. For example, the two-way communication may be possible between the power plant area network **410** and the home area network **430**, and also between electric appliances within the home area network **430**. Or, the two-way communication may be possible between the power plant within the power plant area network **410** and the energy management system within the home area network **430**. Thus, the power consumption of each of the consumers may be monitored and managed to adequately product and distribute electricity.

FIG. **12** is a schematic view of a home area network according to another embodiment.

Referring to FIG. **12**, a house area network **130** may correspond to one local area network within an intellectual power supply network. The home area network **130** may mutually communicate with the other local area network within the intellectual power supply network. Also, the home area network **130** may independently perform energy supply, consumption, storage, measurement, management, and communication. The home area network **130** may largely include an energy supply part, an energy consumption part, an energy metering part, and a local energy management system. Also, the home area network **130** may receive information for a general management of units therein through air channels. For example, the information receivable through the air channels may include a unit identifier, the present electricity charge information, relative level information of the present charge (e.g., high, middle, low), use information (e.g., residential, commercial), and error confirmation information (e.g., CRC information). A module for receiving broadcasting signals may include a digital multimedia broadcasting-terrestrial (DMB-T), a digital multimedia broadcasting-satellite (DMB-S), a media forward link only (mediaFLO), a digital video broadcast-handheld (DVB-H), and an integrated services digital broadcast-terrestrial (ISDB-T). The information obtained from the energy metering part may be transmitted into an external energy metering system, and the information obtained from the local energy management system may be transmitted into an external global energy management system or the other local energy management system.

The energy supply part may supply an electric power to the whole units within the home area network **130**. The energy supply part may include a distributed power source, a plug in hybrid electric vehicle (PHEV), a solar cell, a load control device, and an energy storage. The distributed power source may represent the other power source except a power source supplied from the existing power plant, for example, a power source supplied from the other local area network or a self-powered supply source (plug in hybrid electric vehicle, solar cell). The distributed power source, the plug in hybrid electric vehicle, and the solar cell may produce and store electricity by oneself and provide the produced electricity to the other local area network. The load control device controls the devices by which the electricity is consumed within the home area network **130**. The energy storage stores energy supplied from the external power supply source. Also, as necessary, the energy storage distributes the energy into the units within the home area network **130**.

The energy consumption part consumes the energy supplied from the energy supply part, based on a command transmitted from the local energy management system. The energy consumption part may include a home appliance, an automatic temperature control device, a cable set-top box, and an automatic lighting control device.

The energy metering part is connected to the energy supply part or the energy consumption part to measure energy consumption and collect information with respect to the energy consumption, thereby analyzing the collected information. The energy metering part may include an electricity meter, a gas meter, and a water meter. The information obtained from the energy metering part may be transmitted into the energy metering system.

The whole units within the home area network may mutually communicate with each other. Also, each of the units may include an intellectual device or an energy management program.

Hereinafter, another embodiment according to the present disclosure will be described. Only differences between the present embodiment and the previous embodiment will be mainly described, and the same portions will be denoted by the same description and reference numeral as those of the previous embodiment.

FIG. **13** is a block diagram illustrating internal components of an electric product according to another embodiment.

Referring to FIG. **3**, an electric product **500** includes a product operation control unit **510**, a power information management unit **520**, an environment management unit **525**, a communication management unit **530**, a communication connection unit **540**, and a display unit **550**. When the units are realized in an actual application, as necessary, two or more units may be combined into one unit, or one unit may be divided into two or more units. For example, the power information management unit **520**, the environment management unit **525**, the communication management unit **530**, and the communication connection unit **540** may be coupled to the electric product **500** as separate devices or separately disposed.

Hereinafter, the units will be described in order.

The product operation control unit **510** controls overall operations of the electric product **500**. For example, the product operation control unit **510** controls an operation of each unit of the electric product **500** according to a product operation command transmitted from the power information management unit **520** or the environment management unit **525** to perform functions of the electric product **500**. Also, the product operation control unit **510** may control operations of the power information management unit **520**, the communication management unit **530**, and the display unit **550** according to information inputted by a user.

The power information management unit **520** processes and manages the power information received from the communication management unit **530**. For example, the power information management unit **520** identifies electricity rate information of data received from the communication management unit **530** to transmit a product operation command for reducing the power consumption of the electric product based on the electricity rate information into the production operation control unit **510**. The power information management unit **520** may be provided as a power information management module within the product operation control unit **510**. For example, the power information management module may be provided as hardware within the product operation control unit **510** or as software separated from the product operation control unit **510**.

Here, the electricity information (energy information) may include current power conditions (e.g., power consumption per time or current power rate condition), power quality conditions (e.g., frequency, neutralizing voltage, and high-frequency conditions), environment conditions (e.g., intensities of temperature, moisture, movement, wind, and light), accumulated power consumption costs, instantaneous power consumption costs, power consumption costs per time, energy costs for time-of-use energy rates, costs for critical peak pricing, costs for capacity billing rates, costs for demanded factors (e.g., tax, rental fee, and discount), power consumption costs for parameters defined by the user, power consumption costs for critical history, power productivity/consumption for critical history, or environmental influence information (e.g., carbon dioxide discharge amount, and carbon dioxide discharge estimation amount).

The power information may be processed within the power information management unit **520** to transmit the processed power information into other units within the global area network or the local area network through the communication management unit **530** and the communication connection unit **540** or may be outputted through the display unit **550**.

The environment information management unit **525** transmits a product operation command, by which a carbon emission amount generated from the electric product is calculated to display the carbon emission amount on the display unit **550**, into the product operation control unit **510**. Here, the carbon emission amount of the electric product may be calculated power consumption information received from the power information management unit **520**, for example, power usage information depending on the power consumption. The carbon emission amount multiplies an operation time of the electric product by a weight depending on an operation level, and then by an environmental impact index with respect to manufacturing/disuse of the corresponding electric product.

Also, the environment information management unit **525** may transmit a product operation command into the product operation control unit **510** to display environment information, e.g., exhaust information, weather information, etc., received from the outside through the communication management unit **530** on the display unit **550**.

The communication management unit **530** has a proper identification number of the electric product **10**. Also, the communication management unit **530** manages data transmitted/received through the communication connection unit **540**. For example, the communication management unit **530** may transmit power consumption information or environment information of the electric product within the home area network into the local energy management system or the global energy management system through the communication connection unit **540** and receive power consumption information or environment information from the other electric products within the home area network or the power plant area network.

The communication connection unit **540** may serve as an interface that can mutually communicate with the whole units within the global area network or the local area network. The communication connection unit **540** may include a broadcast receiving module, a mobile communication module, a wireless internet module, a near filed communication module, and a global positioning system (GPS). The broadcast receiving module receives broadcasting signals and/or broadcasting-related information from an external broadcast management server through broadcasting channels. For example, the electric product **500** may receive power consumption information, power supply information, or power management information of the other units within the global area network or the local area network as a signal form.

The display unit **550** may include a sound output module and an alarm output module. Also, the display unit **520** displays power information and processed by the power information management unit **520** and environment information processed by the environment information management unit **525**. Examples of the power information and the environment information were previously described in the descriptions with respect to the power information management unit **520** and the environment information management unit **525**.

For example, the display unit **550** may monitor the present energy conditions (e.g., power consumption per time or current power rate condition), current conditions of the corresponding electric product (e.g., operating, stand-by, and repairing), operation mode conditions (e.g., charging and using), power quality conditions (e.g., frequency, neutralizing voltage, and high-frequency conditions), environment conditions (e.g., intensities of temperature, moisture,

movement, wind, and light), and environmental influence information (e.g., carbon dioxide emission amount).

In case of a touch screen having a mutually layered structure of the display unit **550** and a touch pad, the display unit **550** may be used as an input unit in addition to an output unit. The display unit **550** may include at least one of a liquid crystal display, a thin film transistor-liquid crystal display, an organic light-emitting diode, a flexible display, and a three-dimensional (3D) display. Also, two or more display units may be provided according to a realized configuration of the electric product **500**. For example, the electric product **10** may include an external display module (not shown) together with an internal display module (not shown).

The sound output module outputs audio data received from the communication connection unit **540** in a signal reception, a speech recognition mode, and a broadcast receiving mode. Also, the sound output module outputs sound signals related to functions (e.g., power information receiving sound, event message receiving sound, and product operation status sound) performed in the electric product **500**. The sound output module may include a speaker, a buzzer, etc.

The alarm output module outputs a signal for alarming event occurrence of the electric product **500**. Examples of events occurring in the electric product **500** may include signal reception, message reception for informing charge limitation excess, a signal for informing carbon emission excess etc. The alarm output module may output the signal as a vibration form. When the signal or message is received, the alarm output module may be vibrated to inform the reception of the signal or message. The user may recognize the event occurrence through the vibration. Alternatively, the signal for informing the event occurrence may be outputted through the display unit **550** or the sound output module.

The electric product **500** may be provided in a portable terminal form or a plug device form. In case of the portable terminal form, the electric product **500** may have various types such as a folder type, a swing type, and a slide type.

Hereinafter, an energy management method, which is capable of being executed by the electric product will be described in detail.

FIG. **14** is a flowchart illustrating a process of controlling an electric power in consideration of environmental effects according to another embodiment. Referring to FIG. **14**, a method of controlling electricity in consideration of environment influence will be described.

In operation S**810**, a communication management unit may identify proper identification information of the electric product. In operation S**820**, an estimated power consumption of the electric product is calculated. Thus, a product operation command for minimizing power consumption costs of the electric product in consideration of the calculated estimated power consumption and real-time electricity charge information received from the communication management unit may be transmitted into a product operation control unit.

Also, in operation S**830**, an environment information management unit may transmit a product operation command, by which an estimated carbon dioxide emission amount of the electric product is calculated according to the estimated power consumption or the estimated electricity charge to display the estimated carbon dioxide emission amount on a display unit, into a product operation control unit.

Here, in operation S**840**, the environment information management unit may confirm whether the estimated carbon dioxide emission amount exceeds a preset limitation carbon emission amount or dioxide emission amount within the electric product. After confirming the result, when the estimated carbon dioxide emission amount exceeds the preset carbon dioxide emission amount within the electric product, the environment management unit transmits a product operation command for delaying or pausing an operation of the electric product into the product operation control unit, and the product operation control unit delays or pauses the operation of the electric product in operation S**850**. Then, in operation S**860**, the pause state of the electric product is displayed through the display unit. On the other hand, when the estimated carbon dioxide emission amount does not exceed the preset carbon dioxide emission amount within the electric product, the operation of the electric product is continuously maintained in operation S**870**.

The power information management unit may confirm whether an operation time of the electric product is within an electricity charge maximum period according to the received electricity charge information.

After confirming the result, when the operation time of the electric product is within the electricity charge maximum period, the power information management unit transmits a product operation command for delaying and pausing the operation of the electric product into the product operation control unit. Then, the product operation control unit delays or pauses the operation of the electric product according to the product operation command. Also, the pause state of the electric product is displayed through the display unit. When the operation of the electric product is in the pause state, it is determined whether the operation time of the electric product is out of the electricity charge maximum period for the continuous operation of the electric product. On the other hand, after confirming the result, when the operation time of the electric product is not within the electricity charge maximum period or out of the electricity charge maximum period after it is within the electricity charge maximum period, the operation of the electric product may be continuously maintained or the electric product is re-operated.

Here, when the operation of the electric product is temporarily paused or the electric product is re-operated, the display unit may include the sound output module for outputting the temporary pause or re-operation condition using sound.

Also, the communication management unit further receives power supply information from an external device, and the power information management unit compares the power supply information to estimated power consumption to transmit a product operation command for reducing the power consumption of the electric product into the product operation control unit. Here, when the estimated power consumption is greater than the power supply information, the power information management unit 12 may transmit the product operation command for temporarily pausing the operation of the electric product into the product operation control unit, and the power supply information shows power supply information in which the electricity change information is lowest.

Also, the above-described method of controlling the power, which is applied to the present disclosure, may be programmed as a program that is executed in a computer, and then may be stored in a computer-readable recording medium. Also, data having a data structure according to the present disclosure may be stored in the computer-readable recording medium. The computer-readable recording medium includes various storage devices in which computer-readable data is stored. Examples of the computer-readable recording medium include a ROM, a RAM, a

CD-ROM, a magnetic tape, a floppy disk, and an optical storage device. In addition, the computer-readable recording medium may include a wavelength realized in a carrier wave form (e.g., transmission through an internet). Also, a bit stream generated by the energy management method applied to the present disclosure may be stored in the computer-readable recording medium or transmitted through wire/wireless communication network.

Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

INDUSTRIAL APPLICABILITY

According to the network system of the present disclosure, since the power management program is executed using the environment information management unit, the energy may be further efficiently managed within the intellectual power supply network. Therefore, industrial applicability is significantly high.

The invention claimed is:

1. A method for controlling a network system, the network system comprising: a metering device metering energy supplied from a power supply source; a communication device by which energy information related to the energy metered by the metering device is communicated between the metering device and an electrical product; an energy management device recognizing the energy information to control an operation of the electric product; and an environment information management device that estimates a carbon amount or a carbon dioxide amount, which is generated from the electric product, based on a power consumption value or an electricity charge of the electric product, wherein a power-saving operation mode of the electric product is selectively performed, based on the carbon amount or the carbon dioxide amount recognized by the environment information management device, wherein the energy management device comprises: a first display that displays a first estimated information depending on a user selection mode; and a second display that displays a second estimated information depending on a power saving operation mode on which the energy management device or the environment information management device recommends, the method comprising:

inputting an operation mode of the electric product on the user selection mode;

displaying power consumption and a carbon dioxide emission amount according to the operation mode of the electric product being inputted on the first display;

displaying estimated power consumption and estimated carbon dioxide emission amount depending according to the power saving operation mode on the second display;

determining whether the power saving operation mode is selected or not;

operating the electric product depending on the power saving operation mode if the power saving operation mode is selected, and operating the electric product depending on the operation mode of the electric product being inputted if the power saving operation mode is not selected;

determining whether a target value of at least one of the power consumption or the carbon dioxide emission amount is inputted or not during operation depending on the operation mode of the electric product being inputted;

determining whether the power consumption and the carbon dioxide emission amount being used, are above a threshold if the target value is inputted; and

outputting a warning signal if the power consumption and the carbon dioxide emission amount being used are above a threshold.

2. The method according to claim **1**, further comprising:

determining whether a stop command is inputted after outputting the warning signal.

3. The method according to claim **2**, further comprising:

determining whether a stop command is inputted after outputting the warning signal; and

displaying the power consumption and the carbon dioxide emission amount depending on the operation mode of the electric product being inputted.

4. The method according to claim **1**, wherein the energy management device receives information for a general management of units through air channels.

5. The method according to claim **4**, wherein the air channels comprise:

a unit identifier, electricity charge information, a level information of the electricity charge, and error confirmation information.

6. The method according to claim **4**, wherein the network system further comprises:

a module for receiving broadcasting signals, which includes a digital multimedia broadcasting-terrestrial (DMB-T), a digital multimedia broadcasting-satellite (DMB-S), a media forward link only (mediaFLO), a digital video broadcast-handheld (DVB-H), or an integrated services digital broadcast-terrestrial (ISDB-T).

7. The method according to claim **4**, wherein the network system further comprises:

an energy supply part, which includes a distributed power source, and one of a plug in hybrid electric vehicle (PHEV), a solar cell, a load control device or an energy storage.

8. The method according to claim **4**, wherein the metering device includes an electricity meter, a gas meter, and a water meter.

9. The network system according to claim **1**, wherein whether the electric product is operated in the power-saving operation mode is decided according to whether the carbon amount or the carbon dioxide amount recognized by the environment information management device exceeds a set value.

10. The network system according to claim **9**, wherein, when the carbon amount or the carbon dioxide amount recognized by the environment information management device exceeds the set value, the operation of the electric product is delayed or paused.

11. The network system according to claim **9**, wherein the set value is a preset limitation carbon emission amount or limitation carbon dioxide emission amount.

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